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09/771,019	01/26/2001	Frank C. Hoppensteadt	9138-23	6361

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EXAMINER
HIRL, JOSEPH P

ART UNIT	PAPER NUMBER
2121	7

DATE MAILED: 04/21/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

PTO-90C (Rev. 10/03)

		Application No.		Applicant(s)	
Office Action Summary		09/771,019		HOPPENSTEADT ET AL.	
		Examiner		Art Unit	
		Joseph P. Hirl		2121	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE _3_ MONTH(S) FROM
THE MAILING DATE OF THIS COMMUNICATION.
- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed
  after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
  Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any
  earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on _26 January 2004_.

2a)☒ This action is **FINAL**.   2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is
closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) _1-33_ is/are pending in the application.

    4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☒ Claim(s) _2-8 and 31-33_ is/are allowed.

6)☒ Claim(s) _1,9-12,17-26 and 28_ is/are rejected.

7)☐ Claim(s) _13-16,27,29 and 30_ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

    Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

    Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

    a)☐ All   b)☐ Some * c)☐ None of:

      1.☐ Certified copies of the priority documents have been received.

      2.☐ Certified copies of the priority documents have been received in Application No. _____.

      3.☐ Copies of the certified copies of the priority documents have been received in this National Stage
application from the International Bureau (PCT Rule 17.2(a)).

    * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1)☐ Notice of References Cited (PTO-892)

2)☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3)☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____.

4)☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ .

5)☐ Notice of Informal Patent Application (PTO-152)

6)☐ Other: _____.

DETAILED ACTION

1.   This Office Action is in response to an AMENDMENT entered January 26, 2004

for the patent application 09/771,019 filed on January 26, 2001.

2.   The First Office Action of July 24, 2003 is fully incorporated into this Final Office

Action by reference.

3.   The claims and only the claims form the metes and bounds of the invention.

"Office personnel are to give the claims their broadest reasonable interpretation in light

of the supporting disclosure. *In re Morris,* 127 F.3d 1048, 1054-55, 44USPQ2d 1023,

1027-28 (Fed. Cir. 1997). Limitations appearing in the specification but not recited in

the claim are not read into the claim. *In re Prater,* 415 F.2d, 1393, 1404-05, 162 USPQ

541, 550-551 (CCPA 1969)" (MPEP p 2100-8, c 2, I 45-48; p 2100-9, c 1, I 1-4). The

Examiner has full latitude to interpret each claim in the broadest reasonable sense.

Examiner will reference prior art using terminology familiar to one of ordinary skill in the

art. Such an approach is broad in concept and can be either explicit or implicit in

meaning.

4.   Examiner's Opinion:

       Para 3 above applies. The claims and only the claims form the metes and

bounds of the invention. Examiner has full latitude to interpret each claim in the

broadest reasonable sense. To one of ordinary skill in the art, simulation of neural

networks by whatever means is well established in the art. Merely coupling signals

together without defining how the signal was developed begs for prior art.

Status of Claims

5.   Claims 1-3, 5, 6, 9, 11, 12, and 17-20 are amended. Claims 21-33 are new.

Claims 1-33 are pending.

Claims Allowed

6.   Claims 2-8, 31-33 are allowed.

Claims Objected

7.   Claim 26 is objected to under 37 CFR 1.75(c), as being of improper dependent

form for failing to further limit the subject matter of a previous claim. Applicant is

required to cancel the claim(s), or amend the claim(s) to place the claim(s) in proper

dependent form, or rewrite the claim(s) in independent form. Claim 26 is merely a

restatement of claim 25, with the equation being written out in text fashion.

8.   Claims 13-16 and 27, 29 and 30 are objected to as being dependent upon a

rejected base claim, but would be allowable if rewritten in independent form including all

of the limitations of the base claim, any intervening claims and related requirements of

this office action. Notwithstanding such considerations, superposition does not apply

and the rewritten claims will be required to stand muster in their final configuration.

Claim Rejections - 35 USC § 112

9.   The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly
> claiming the subject matter which the applicant regards as his invention.

10.   Claims 25, 26 and 28 are rejected under 35 U.S.C. 112, second paragraph, as

being indefinite for failing to particularly point out and distinctly claim the subject matter

which applicant regards as the invention. The use of the term "substantially" is

indefinite and renders the subject claims indefinite.

Response to Arguments

11.   Applicant's arguments filed on January 26, 2004 related to Claims 1 and 9-30

have been fully considered but are not persuasive.

In reference to Applicant's argument:

Claim 1 of the application stands rejected as anticipated by the Ahissar patent of record. In regard to that
rejection, the examiner states that Ahissar "anticipates a weighting network having a plurality of output
terminals, the weighting network having phase-based connection strengths ...." The examiner cites the
Ahissar abstract, Fig. 3A and col. 24 - lines 32 - 35. Applicant acknowledges that Ahissar relates to
neuronal phase-locked loops. However, tile Ahissar patent does not, it is urged, contain a "weighting
network" like that set forth in claim 1 as currently presented. In other words, claim 1 has been amended to
make it clear that the weighting network exists outside of the phase-locked loops unlike Ahissar's Fig. 3A
which is Ahissar's phase-locked loop. The weighting network of claim 1 has "inputs operably coupled to
outputs of the phase-locked loop and outputs operably coupled to inputs of the phase-locked loop."
Nothing in the Ahissar patent suggests such an arrangement. Indeed, Ahissar makes it clear that Fig. 3A
is the phase-locked loop. Referring to an excitatory phase-locked loop (ePLL) and an inhibitory phase-
locked loop (iPLL), Ahissar states:

> "An ePLL is an implementation in which the PD [phase detector] excites the RCO [rate controlled
> oscillator] (FIG. 3A, dashed lines; FIG. 313, AND, OR, ANDNOT and AOR), while iPLLs are those
> implementations in which the PD inhibits the RCO (FIG. 3A, dotted lines; FIG. 313, NAND, NOR,
> NANDNOT and NAOR). Herein, AND-like and NAND-like neuronal implementations are
> described in detail."

Examiner's response:

Para 3 applies. The Examiner has full latitude to interpret each claim in the

broadest reasonable sense. To one of ordinary skill in the art, it is axiomatic that all

neural networks have "weighting networks." Consequently, claim 1 as amended is

anticipated by Ahissar. Claim 1 simply does not have the specific limitations (broader)

discussed above.

In reference to Applicant's argument:

Similarly, claim 9 stands rejected as anticipated by Ahissar. Claim 9, as well, leas been amended to make
it clear that the phase shift circuits are part of a weighting circuit that is exterior to the phase-locked loops
being "operably connected to an input of one of the phase locked loops." In the rejection of claim 9, the
examiner points to col. 1, lines 13 - 38 of Ahissar to say that Ahissar teaches weighting elements
comprising a phase shift circuit as called for by claim 9. However, col. 1, lines 13 - 38, it is clear, refers to
the phase-locked loop circuit itself and to nothing external of the phase-locked loop circuit. With the
clarifying amendment to claim 9, claim 9 also clearly patentably differs from Ahissar. A further amendment
to claim 9 has been made incorporating claim 1 as previously incorporated by its dependency so that
claim 9 is now independent.

Examiner's response:

Para 3 applies. The Examiner has full latitude to interpret each claim in the

broadest reasonable sense. All neural networks have weighting networks. There is

nothing in claim 9 concerning the term "external".

In reference to Applicant's argument:

Claim 10 stands rejected as anticipated by Ahissar. This claim is dependent from claim 1 and
incorporates the patentable features set forth in claim 1 by its dependency. Irrespective of any patentable
subject matter added by claim 10, this claim, it is urged, is patentable by its dependency.

Claim 11 stands rejected as anticipated by Ahissar. The examiner refers to the abstract, FIG. 3A and
columns 24, lines 32 - 35, the same parts of the Ahissar patent referred to in the rejection of claim 1.
Claim 11 has also been amended for clarity. Claim 11 sets forth "each of the connectors having means
for establishing a gain and a phase shift circuit." It is respectfully urged that this is unlike any connectors
described by Ahissar.

Examiner's response:

Para 3 applies. Claim 10 depends from claim 1 and has been rejected. Any

terminal (signal) to a weighting circuit can be viewed as functionally initializing. MPEP

requires that dependent claim be further limiting and not adding of subject matter.

Ahissar anticipates connectors having means for establishing a gain and a phase shift

circuit (Ahissar at abstract).

In reference to Applicant's argument:

Claim 18 stands rejected as anticipated by Ahissar, the examiner pointing to col. 1, lines 9 - 12. Claim 18
is directed to a method for recognizing an incoming pattern using a neural network computer grid. It has
been amended slightly for clarity such that it is now clear that it includes the step of using a phase
deviation between signals representing a learned pattern and signals representing the incoming pattern.
Lines 9 - 12 of col. 1 of Ahissar state:

> "The invention is directed to a novel device, called a "neuronal phase-locked loop" (NPLL), that
> can decode temporally-encoded information and convert it to a rate code."

Applicant respectfully urges that this statement does not refer to either a "learned pattern" or an "incoming
pattern." Neither does it refer to using a phase deviation between tile two patterns to arrive at an output
signal indicative of the learned pattern

Examiner's response:

Para 3 applies. The Examiner has full latitude to interpret each claim in the

broadest reasonable sense. To one of ordinary skill in the art, Ahissar's "A Neuronal

Phased-Locked Loop" functions this way. Phase deviation is what phase locked loops

are all about.

In reference to Applicant's argument:

Claim 19 also stands rejected as anticipated by Ahissar. Claim 19 is dependent from claim 18 and
incorporates, by its dependency, the pattentable subject matter of claim 18 discussed just above. The
examiner's rejection cites to Ahissar col. 1, lines 9 - 12 and col. 6, lines 45 - 47, but as previously stated

with respect to lines 9 - 12 there is no teaching of claim 18's use of a phase deviation between patterns to create a signal indicative of a learned pattern. Likewise, col. 6, lines 45 - 47 states only:

> "The basic ePLL is a straight forward implementation of the NPLL algorithm (FIG. 2) and involves two sets of neurons: the PD and RCO sets (FIG. 3A)."

Examiner's response:

Para 3 applies. See comments concerning claim 18.

In reference to Applicant's argument:

Claim 20 has been rejected over the Ahissar patent. Again the examiner cites to col. 1, lines 9 - 12. The examiner's note says "the learning is represented by how to decode and then convert." However, claim 20 refers a method of programming a neural network computer using encoding connection coefficients in accordance with the phase relationships of signals representing a pattern to be learned. Nothing of this nature is expressed in col. 1, lines 9 - 12 and it is respectfully urged that claim 20 should be allowed at this time. The amendment to claim 20 is for clarifying purposes such that it is now clear that it is signals representing a pattern whose phase relationships are used by the neural network computer.

Examiner's response:

Para 3 applies. To one of ordinary skill in the art, the concept of neural networks are well established. Further, to one of ordinary skill in the art, Phase-Locked Loops are well established. Ahissar has integrated these concepts. Phase relationships as the learning mechanism is well established in Ahissar.

In reference to Applicant's argument:

Claims 2 - 8 and 12 - 17 were objected to as being dependent from rejected claims. Claim 2 has been rewritten in independent form and should now be allowed. Claims 3, 4 and 5 include by their dependency the subject matter of allowable claim 3 and are no longer dependent from a rejected claim. These should be allowed at this time, as well. Claim 6 has been rewritten in independent form and should therefore be allowed it is believed. Claims 7 and 8 are dependent claims that include the subject matter of claim 6, are no longer dependent from a rejected claim, and also should be allowed. Claim 12 has been rewritten in independent form and claims 13 - 16 include by their dependency the subject matter of claim 12. All of these claims are believed allowable. Claim 17 has been rewritten in independent form and should be allowed, it is urged.

Examiner's response:

Para 3 applies and provides the basis for final determination. Mere

superposition does not apply. It is only when the claim is seen in its final form that a

determination can be made for the sake of allowance. The review below under U.S.C.

102(e) applies.

In reference to Applicant's argument:

Concerning the newly added claims 21 - 33, claims 21 - 23 are allowable by their dependency, incorporating therein the subject matter of claim 18. Claim 24 is dependent from claim 23 and allowable on the same basis as claim 23 in addition to any independently patentable subject matter added by way of that claim. Claim 25 is a new independent claim that sets forth an oscillatory neural network computer having, in addition to phase-locked loop circuits, weighting circuits with "output voltages of substantially the form:

$$V(\theta) = S_{kj}{}^*V(\theta + \psi_{kj}) .$$

This is unlike Ahissar and all further art of record. Allowance of claim 25 at this time is respectfully requested. Claims 26 and 27 are dependent from claim 25 and are therefore patentable with claim 25, irrespective of any independently patentable subject matter added by those claim. Claim 28 is an independent claim that sets forth the neural network being "a dynamic system that is described mathematically substantially as:

$$d\theta_k(t)/dt = \Omega + V(\theta_k)\Sigma\ S_{kj}{}^*V(\theta_j-\pi/2)$$

for k=1,...,N, where:

θ_k is the phase of a VCO embedded in the kth PLL circuit;
θ_j is the phase of the VCO embedded in the jth PLL circuit;
Ω is the natural frequency of the VCO in MegaHertz (MHz);
S_{kj} are the connection strengths; and
$V(\theta)$ is a $2\pi T$ periodic waveform function.

This is unlike the Ahissar neuronal phase-locked loops and any further art of record. Claim 28, it is urged, should be allowed at this point. Claims 29 and 30 incorporate by their dependency the subject matter of claim 28 and, independent of any further patentable subject matter contained therein, should be allowed at this point. Claim 31 is a further independent claim in which nz weighting circuits operably connect an output of each phase-locked loop to each of the n adder circuits. This is totally unlike Ahissar. No further art of record teaches such an arrangement. This claim, it is respectfully urged, is allowable at this time. Claims 31 and 33 are dependent from claim 32 and are patentable by virtue of their dependency, irrespective of any patentable content contained in those claims.

Examiner's response:

Para 3 applies and provides the basis for final determination. Mere

superposition does not apply. It is only when the claim is seen in its final form that a

determination can be made for the sake of allowance. The review below under U.S.C.

102(e) applies. Claims must be specific and the term "substantial" is indefinite and

reduces the related claims to a level being indeterminate.

Claim Rejections - 35 USC § 102

12.   The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that

form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

13.   Claims 1, 9-12 and 17-24 are rejected under 35 U.S.C. 102(e) as being

anticipated by Ahissar (U.S. Patent 6,581,046 referred to as Ahissar).

Claim 1

Ahissar anticipates a weighting network having a plurality of output terminals, the

weighting network having phase-based connection strengths (**Ahissar**, Abstract; Fig.

3A; col 24, lines 32-35); and a plurality of phase-locked loop circuits operably coupled

with said weighting network (**Ahissar**, col 1, lines 13-38; Examiner's Note (EN): the

phase-lock is driven by the feedback which is synonymous with weighting or measure);

the weighting network having inputs operably coupled to outputs of the phase-locked

loops and having outputs operably coupled to inputs of the phased-locked loops

(**Ahissar**, c 5, l 4-26).

Claim 9

Ahissar anticipates the weighting network having phase-based connection

strengths (**Ahissar**, Abstract; Fig. 3A; col 24, lines 32-35); and a plurality of phase-

locked loop circuits operably coupled with said weighting network (**Ahissar**, col 1, lines

13-38; Examiner's Note (EN): the phase-lock is driven by the feedback which is

synonymous with weighting or measure); wherein a network comprises a plurality of

phase shift circuits each phase shift circuit connected in a weighting circuit operably

connected to an input of the phase-locked loops (**Ahissar**, col 1, lines 13-38;

Examiner's Note (EN): the phase-lock (shift as necessary) is driven by the feedback

which is synonymous with weighting or measure of the implementing circuits).

Claim 10

Ahissar anticipates the weighting circuit further includes a plurality of initialization

input terminals (**Ahissar** , Fig. 3A).

Claim 11

Ahissar anticipates a plurality of connectors, wherein each connector has a

phase-encoded connection coefficient (**Ahissar**, Abstract; Fig. 3A; col 24, lines 32-35;

EN: connection coefficient is synonymous with weights which is synonymous with

feedback) ; and phase-locked loops having a plurality of oscillators operably coupled

with said plurality of connectors, each of the connectors having means for establishing a

gain and a phase shift circuit (**Ahissar**, Fig. 3A; EN: to one of ordinary skill in the art,

connectors are passive devices and it is only the active devices of the circuit that can

provide gain and phase shift).

Claim 12

Ahissar anticipates a plurality of connectors, wherein each connector has a

phase-encoded connection coefficient (**Ahissar**, Abstract; Fig. 3A; col 24, lines 32-35;

EN: connection coefficient is synonymous with weights which is synonymous with

feedback); a plurality of oscillators operably coupled with said plurality of connectors

(**Ahissar**, Fig. 3A); and a plurality of adder circuits coupled between the plurality of

connectors and said plurality of oscillators (**Ahissar**, col 6, lines 36-44).

Claim 17

Ahissar anticipates a plurality of connectors wherein each connector has a

phase-encoded connection coefficient (**Ahissar**, Abstract; Fig. 3A; col 24, lines 32-35;

EN: connection coefficient is synonymous with weights which is synonymous with

feedback); a plurality of oscillators operable coupled with said plurality of connectors

(**Ahissar**, Fig. 3A); and the plurality of connectors comprises a linear amplifier coupled

to a phase shift circuit (**Ahissar**, col 1, lines 25-68; EN: amplification is related to the

gain of the system).

Claim 18

Ahissar anticipates a phase deviation between signals representing a learned

pattern and signals representing the incoming pattern to create an output signal

indicative of the learned pattern (**Ahissar**, col 1, lines 9-12).

Claim 19

Ahissar anticipates wherein using the phase deviation includes encoding

connection coefficients of the neural network computer in accordance with phase

representations of the signals representing a learned pattern (**Ahissar**, col 1, lines 9-12; col 6, lines 45-47).

Claim 20

Ahissar anticipates a neural network computer comprising encoding connection coefficients of the neural network computer in accordance with phase relationships of signals representing a pattern to be learned (**Ahissar**, col 1, lines 9-12: EN: the learning is represented by how to decode and then convert).

Claim 21

Ahissar anticipates comprising providing an oscillatory neural network, initializing the network by applying initializing signals to multiple initializing inputs, and after initializing feeding back to multiple connector outputs of multiple please-locked loops amplifying, at the connectors, the outputs fed back thereto, phase shifting the outputs fed back thereto and applying the amplified, phase-shifted outputs to inputs of the phase-locked loops (**Ahissar**, abstract, Fig. 3A).

Claim 22

Ahissar anticipates for programming a neural network computer in accordance with claim 21, wherein encoding connection coefficients comprises establishing the gains of a plurality of amplifiers connected between outputs of a plurality of phase-locked loops and a plurality of inputs to the phase-locked loops (**Ahissar**, c 22, l 63-67; EN: to one of ordinary skill in the art, simulation by computer means encoding and gains of the system is what would be encoded).

Claim 23

Ahissar anticipates programming a neural network computer according to claim 22, further comprising applying the outputs of individual phase-locked loops to multiple amplifiers connected to inputs to the multiple phase-locked loops (**Ahissar**, c 22, l 63-67; EN: to one of ordinary skill in the art, simulation by computer means encoding and gains of the system is what would be encoded).

Claim 24

Ahissar anticipates programming a neural network computer according to claim 23, further comprising phase-shifting the outputs of the phase-locked loops being applied to inputs to the multiple phase-locked loops (**Ahissar**, c 22, l 63-67; EN: to one of ordinary skill in the art, simulation by computer means encoding and gains of the system is what would be encoded).

Conclusion

14.   Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within

TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

15.   Claims 13-16, 27, 29 and 30 are objected to. Claims 1, 9-12, 17-26, and 28 are rejected. Claims 2-8, and 31-33 are allowed.

Correspondence Information

16.   Any inquiry concerning this information or related to the subject disclosure should be directed to the Examiner, Joseph P. Hirl, whose telephone number is (703) 305-1668. The Examiner can be reached on Monday – Thursday from 6:00 a.m. to 4:30 p.m.

If attempts to reach the Examiner by telephone are unsuccessful, the Examiner's supervisor, Anil Khatri can be reached at (703) 305-0282.

Any response to this office action should be mailed to:

Commissioner of Patents and Trademarks,

Washington, D. C. 20231;

or faxed to:

(703) 746-7239 (for formal communications intended for entry);

or faxed to:

(703) 746-7290 (for informal or draft communications with notation of

"Proposed" or "Draft" for the desk of the Examiner).

Hand-delivered responses should be brought to:

Receptionist, Crystal Park II

2121 Crystal Drive,

Arlington, Virginia.

Anthony Knight
Supervisory Patent Examiner
Group 3600

Joseph P. Hirl

April 6, 2004